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ABSTRACT

This survey reports the current state of development of pollution prevention education in Universities in the United States based on a national survey conducted between December 1991 and February 1992. Over 140 individuals (from 80 institutions) believed to be active in pollution prevention education were contacted and of these 89 (from 59 institutions) provided information on their pollution prevention education efforts. Highlights of the survey include: (1) pollution prevention education is heavily concentrated in engineering departments; (2) most curriculum development is done by individuals or small groups in relative isolation at their home institutions; (3) universities in some states are active in a broad spectrum of pollution prevention activities; (4) the lack of consensus on the definition of pollution prevention means that here is no general agreement on the elements and intellectual content of pollution prevention education and research; and (5) an "end-of-pipe" mind-set that evolved from years of control regulations prevails among professionals in industry and at universities. The report contains summaries of responses that briefly describe each program and list telephone number, contact person(s), address, and department in which the program exists. Appendixes include a key word index, programs indexed by faculty name, an index of institutions, an index of programs by state, and a form for submitting updates. (JB)

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National Pollution Prevention Center
for Higher Education

University of Michigan
Dana Bldg., 430 E. University

Doc # 93-2

ED 362 078

Directory of Pollution Prevention in Higher Education:

Faculty and Programs 1992

Nandkumar Bakshani, Ph.D.
David Allen, Ph.D.
University of California--Los Angeles

HE 026 626

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Directory of Pollution Prevention in Higher Education:
Faculty and Programs
1992

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Preface

Nandkumar Bakshani is a research fellow and Professor David Allen is Chairman of the Department of Chemical Engineering in the School of Engineering and Applied Sciences at the University of California – Los Angeles. This directory was prepared for the Pollution Prevention Education Committee of the National Advisory Council for Environmental Policy and Technology of the U.S. EPA. It was originally submitted to the Committee in January 1992 but has been updated continuously since then.

This Directory is published by the National Pollution Prevention Center for Higher Education (NPPC) which was founded by the U.S. EPA in October 1991 to develop and disseminate pollution prevention educational materials for use in higher education. The Center undertook this project to help build a national network of pollution prevention educators. Using this network the Center will collect existing educational materials and facilitate the development of new materials. Pollution prevention education materials will be disseminated in the form of discipline specific pollution prevention modules. These modules are sets of resources and teaching aids that faculty can use to incorporate pollution prevention into their courses. These modules will serve as the vehicles through which the individuals exchange information in the network. All faculty that are interested in the pollution prevention modules are encouraged to contact the Center for more information. The Center is always seeking new educational materials to include in the modules.

It is the intent of the Center to update and refine the directory yearly. We recognize that we may not have included everyone that is currently active in pollution prevention at universities and, thus, strongly encourage the user to submit all changes, corrections, additions, deletions, and other recommendations to the Center. At press time we received additional materials that will be included in the next version.

The Center would like to take this opportunity to thank Amanda Grupe for the work she did on the text layout and graphic art work in this directory. We would also like to the thank David Smith of the University of Michigan School of Art's Graphic Design Studio for recommending Amanda and providing other support and guidance throughout our many projects.

We hope that this Directory will be useful to you in your important work in pollution prevention.

Jonathan W. Bulkley
NPPC Director

Gregory A. Keoleian
NPPC Manager

Douglas H. Moody
NPPC Editor

Executive Summary

This survey reports the current state of development of pollution prevention education at Universities in the United States, based on a national survey conducted between December 1991 and February 1992. Over 140 individuals (from 80 institutions) believed to be active in pollution prevention education were contacted, and of these, 89 individuals (from 59 institutions) provided information on their pollution prevention education efforts. Summaries of each of the individual reports are given in the section *Summary of Responses*.

Study of the survey reveals that:

- Pollution prevention education is occurring in a large number of academic disciplines but is heavily concentrated in engineering departments, particularly chemical and civil/ environmental engineering. Even though chemical engineering is leading in pollution prevention efforts, less than 25% of the chemical engineering departments (32/155) were identified as being active in pollution prevention education and roughly 25% of the thirty-seven hundred 1990 chemical engineering graduates (B.S. degree) were exposed to pollution prevention at some level. It tends to be taught as a specialized senior elective or graduate course, rather than as a fundamental element of the core curriculum.

- Most curriculum development on pollution prevention is done by individuals or small groups in relative isolation at their home institutions. Comprehensive pollution prevention and environmental education efforts have emerged at a few universities, where they are generally associated with research centers.

- Pollution prevention education is gradually penetrating the social sciences and liberal arts. However, educators in these disciplines are aware of the strong technical component of pollution prevention and would like to see a better science background for all students.

- Universities in some states are active in a broad spectrum of pollution prevention activities (see **Appendix D**). These states tend to have mandated pollution prevention and actively assist the development of pollution prevention methods through grants or sponsored studies.

- The lack of consensus on the definition of pollution prevention means that there is no general agreement on the elements and intellectual content of pollution prevention education and research. This lack of definition also hinders transfer of curricular materials among universities.

- The end-of-pipe mind-set that has evolved from years of control regulations prevails among many professionals both in industry and at universities. Even though many industrial analysts agree that pollution prevention is more profitable than end-of-pipe treatment, industry is slow to fund pollution prevention projects at universities. This in turn impedes the proliferation of pollution prevention education at universities.

Pollution Prevention — Survey of Educational Initiatives

Introduction

Innovative companies of today realize that preventing pollution is a proactive, cost effective way to address increasingly stringent environmental regulations. Regulatory agencies are beginning to employ pollution prevention approaches in permit writing and settlement agreements. As pollution prevention becomes the dominant industrial and regulatory strategy for preserving environmental quality, the educational background of environmental professionals and decision makers will require more pollution prevention education. Universities, as institutions charged with educating the next generation of environmental decision makers, should be taking a leading role in defining pollution prevention curricula.

The objective of this study was to survey the current state of university-based pollution prevention education in the United States. The survey includes developments of pollution prevention materials in a wide range of disciplines at close to 60 institutions nationwide.

Methodology

The 140 individuals at Universities and colleges that were contacted during the survey were identified through a variety of sources: previous pollution prevention directories and surveys[1], publications, word of mouth, and other sources. The individuals surveyed were asked to address three broad issues:

1) Scope and emphasis of their pollution prevention program;
2) Type, level, and frequency of courses, enrollment figures, and teaching aids developed; and
3) Complementary research and funding sources.

The fact that the survey focused on individuals is a reflection of the state of curriculum development on pollution prevention. With very few exceptions the pollution prevention educational material developments are being made by individuals acting in isolation or in small groups at their home institutions. These individuals and groups are most often located in the departments of: agriculture, business, chemical engineering, chemistry, civil/environmental engineering, public health, and professional education (university extension schools). Some non-university personnel active in pollution prevention, operating through community colleges, were also contacted. Concerted group efforts at pollution prevention education are rare but, where they exist, are almost always associated with university-based centers.

Findings

The findings of the survey will be grouped into six major categories: definitions, science and engineering, business, social sciences and other disciplines, pollution prevention centers, and state influences. Details of any mentioned activity can be found in the *Summary of Responses*.

Definitions

The term "pollution prevention" has no broadly accepted definition. The spectrum of activities that are called pollution prevention ranges from toxics use reduction to disposal of wastes. This confusion and lack of common terminology limits the transferability of the curriculum materials.

Many people use pollution prevention to refer to the hierarchy of environmental actions as adopted in the Pollution Prevention Act of 1990:

- Prevent or reduce pollution at the source whenever feasible
- Pollution that cannot be prevented should be recycled in an environmentally safe manner
- Pollution that cannot be prevented or recycled should be treated safely
- Environmentally safe disposal or release should proceed only if no other option is available

Because some people associate this hierarchy with pollution prevention, many believe that pollution prevention covers everything from source reduction to waste disposal. The authors of this survey use pollution prevention to mean *source reduction* which is later defined in section 6603 of the Act to mean (condensed form, not a direct quote):

> *. . . any practice that reduces the amount or environmental and health impacts of any pollutant released into the environment prior to recycling, treatment, or disposal. This includes equipment or technology modification, process or procedure modification, reformulation or redesign of products, substitution or raw materials, and improvements in housekeeping, maintenance, training, or inventory control. Source reduction does not include any activity that is not integral to producing a good or providing a service.*

This confusion over the definition of pollution prevention leads to pollution prevention educational materials based on everything from disposal to source reduction and energy conservation. Course materials on pollution prevention that address the entire hierarchy are vastly different from materials that focus on source reduction. Either of those courses would be difficult to integrate with course materials that focus on life cycle analyses or toxics use reduction.

Science and Engineering

The primary focus in environmental engineering education (and in some cases chemical engineering) continues to be on control technologies rather than pollution prevention. A few environmental and chemical engineering programs--among them North Carolina State, Tennessee, and UCLA--are beginning to add pollution prevention classes. Most programs, if they cover pollution prevention at all, do so in a course module. When departments offer these classes or course modules, however, they tend to be directed toward undergraduate seniors, graduate students, or professionals. Many of the courses are electives and are weakly tied to the core curricula. Approaching pollution prevention in this manner implies that pollution prevention is almost an afterthought.

There have been relatively few attempts to inoculate core engineering and science courses with pollution prevention concepts. In some senior chemical process design courses (e.g. UCLA), waste minimization is taught as an engineering optimization procedure. In computer science courses at Carnegie Mellon students employ pollution prevention concepts in automotive product design. At the University of Minnesota and Washington State University, chemistry laboratories are being revised to incorporate pollution prevention procedures.

Business

Business schools have had little history of addressing environmental issues, so the focus of many efforts has been to open the door for environmental topics, be it management of waste treatment costs, minimizing remediation liability, marketing green products, or capital budgeting for pollution prevention. As these programs mature, it is likely that a greater focus on pollution prevention will emerge.

Groups such as the Management Institute for Environment and Business (MEB) have been leaders in developing educational materials for business schools on the business-environment interaction. Other examples include efforts by the Tellus Institute and the Universities of Houston, Michigan, Minnesota, and Washington.

Social Sciences and Other Disciplines

Pollution prevention education has recently entered the domain of the social sciences and liberal arts. For instance, the Anthropology and Archaeology Department at the University of Arizona offers a course that examines data from analyses of garbage and landfills (comparing the public's perception of the composition of a landfill versus actual garbage in landfills) and applies life-cycle analysis to commodities and products. At the University of Minnesota, the Housing, Design, and Apparel Department has introduced a course, "The Designed Environment," that

teaches students to use life-cycle analyses to help them select the best reusable/recyclable materials to construct a theater set. The course also addresses pollution prevention issues in applied design arts and graphics design.

Pennsylvania State University and UCLA both offer courses in geography that discuss human attitudes and behavior that are causing degradation of the environment. Courses also address public policy issues, such as zoning laws and their impact on commuter driving distances, taxes on pollution, and other positive incentives to prevent pollution. In the field of education, Clark Atlanta University runs an intensive one- to two-week teacher training program on environmental sciences and pollution prevention for grades kindergarten through twelve (K-12). The program emphasizes the need for more science education for K-12 students.

Pollution Prevention Centers

A number of PP centers have been established at universities. University-based pollution prevention centers offer the potential for crossing disciplinary boundaries and developing the multi-faceted materials required in pollution prevention education. Such multi-disciplinary efforts can also develop in the absence of a center structure; centers merely provide greater impetus for such exchanges to occur.

State Influences

Universities in 34 out of the 39 states contacted reported some level of ongoing PP activity. The PP activity may or may not be directed from the state level, though a few university departments indicate that state/federal legislation mandating PP is driving their activity. **Appendix D** lists university courses or activities alphabetically by state. Almost all states have legislation mandating pollution prevention at some level, but only some state have legislative elements dealing with assistance for the development of educational and informational resources. Grants and sponsored studies to help develop pollution prevention methods are part of these elements. There are many reasons for development of educational resources so **Appendix D** may be viewed as just one indicator of the degree of state commitment to pollution prevention education.

Barriers to Advancement of Pollution Prevention

Professors quizzed on incorporation of pollution prevention courses in their departmental curricula cited several issues, besides the definition of pollution prevention, as potential barriers to this educational endeavor. Often mentioned is academic departmental commitment to pollution prevention. The "academic plate" in most departments is full. Thus, addition of new courses must be at the expense of existing courses. In general, pollution prevention concepts are now being introduced within pre-existing courses.

The dearth of available pollution prevention course materials and tools also affects departmental commitment. For example, professors in business/public administration schools focus on financial evaluation of conventional end-of-pipe investments because teaching or conducting an overall assessment of pollution prevention investments is complex given the lack of understanding of long term, hidden, and less tangible benefits and the lack of tools and materials needed to teach pollution prevention. A few groups (University of Michigan, University of Minnesota, and Tellus Institute) are reportedly committed to develop tools to integrate pollution prevention economics into their mainline functional areas: accounting, finance, and marketing. One of the challenges here is to alter financial investment practices from environmental control to pollution prevention.

Professors in most non-science disciplines understand that there is a technical side to pollution prevention and are concerned over the low level of general science background in the liberal arts and social science student populations. Environmental professionals and legislators poorly versed in the cognitive process of pollution prevention are potential barriers to effective implementation of pollution prevention methods and policy.

The most frequently mentioned problem for the advancement of pollution prevention is the lack of funding for technology research on pollution prevention. Industries interested in meeting their immediate problem--end-of-pipe regulatory standards--have a limited incentive to invest in the development of new pollution prevention technology. Furthermore, since universities generally base tenure and advancement decisions on tangible research results, fewer junior faculty may be willing to pursue pollution prevention projects, which may have less well defined end-points. Funding agencies generally look for short term hard and measurable goals/results in their funding decisions. The result of the problems in funding of pollution prevention research is a paucity of new and important research results that can often serve as valuable course material. Thus the lack of pollution prevention projects adversely impacts the development of quality courses, creating a cycle that further delays the training of new pollution prevention investigators.

The Next Step

There is much that universities, industry and government agencies can do to overcome these barriers to expand pollution prevention education and research.

- EPA could integrate its emphasis on pollution prevention in more of its programs in environmental education.
- Industry could require that entering employees receive pollution prevention training in the same way they automatically receive safety training. Such requirements would significantly increase the demand for pollution prevention materials.
- Accrediting agencies could require some exposure to pollution prevention in the core curricula.
- Efforts to facilitate the exchange of educational materials and general information between college and university educators should continue to be made. This survey was a step towards initiating communication between educators with similar interests.

Such proactive endeavors would no doubt open the door for more university course offerings.

End Notes

[1] Washington State Department of Ecology (Publication #91-33); WRITAR, Minneapolis, MN, National PP Survey Results as published in the proceedings of their conference, "Pollution Prevention and Higher Education Curricula," University of Minnesota–St. Paul, Dec. 9, 1991.

A Summary of Responses

Current Status of Pollution Prevention in College/University Curricula

Anthropology

Doug Wilson/Tim Jones 602 621-6299

University of Arizona
Bldg. #30, Tucson AZ 85721

Dept. of Anthropology (Archaeology subgroup)
Fax 602 621-2550

PP focus is on garbage analysis and landfills. Courses taught in the past included topics such as garbage data analysis and life cycle analysis of commodities and products. Currently working on a book on public behavior and how it impacts PP.

key word index: *anthropology; solid waste; life cycle analysis; behavior; book*

Agriculture

Engineering
Resources

Charles Clanton 612 625-9218

University of Minnesota
1390 Eckles Ave., St. Paul, MN 55108

Dept. of Agricultural Engineering
Fax 612 624-3005

Teaches Sr. and Gr. level courses (uses role-playing) on the pollution caused by livestock waste. Addresses PP concepts in dealing with this rapidly growing problem (believed to be as serious as pesticide control and soil erosion control problems). The number of PP related courses has gradually been reduced to one. Lack of funding was cited as the main reason. The general impression is that EPA and other funding sources apparently do not recognize livestock waste as a major PP issue.

key word index: *agriculture; livestock; role playing*

George Criner 207 581-3152

University of Maine
206 Winslow Hall, Orono, ME 04469

Dept. of Agricultural Resources

Offers courses (with field trips) from sophomore to graduate levels in waste reduction. Main areas of interest are in the land application of waste materials and the variation of waste with seasons. Would like to see a course in composting in the near future. Partial funding from an NSF grant.

key word index: *agriculture; land use; field trips*

Architecture

Patrick Lally 202 626-7463

American Institute of Architects (AIA)
1735 New York Ave., NW
Washington, D.C. 20006-5292

Director, AIA *Environmental Resource Guide*

The AIA, as major players in the design community, have approved some immediate "Actions in Support of the Environment" in May 1991. These actions include: encouraging societal participation in incentive programs designed to reduce demand for energy; eliminating the use of CFCs; specifying woods in the design from sustainable forests only; improving fresh air ratios; including environmental costs in the economic equation of buildings; and using life cycle

analysis for selecting materials, systems, and assemblies. He is editor of the AIA's *Environmental Resource Guide*, a quarterly subscription service which provides architects with the resources they need to become more environmentally sensitive. One of the primary goals of the AIA is communicating these actions to universities, as well as the public and private sectors.

key word index: *architecture; design; incentives; life cycle analysis; energy*

Biology

Charles Kulpa — 219 239-5592

University of Notre Dame
South Bend, IN 46556

Dept. of Biological Sciences
Fax 219 239-7413

Teaches an UG environmental science course with summer research programs. Notre Dame has formed the Center for Bio-Engineering and Pollution Control in the Civil Engineering Department with Argonne National Labs to train graduates in the application of bio-engineering principals as an alternative to traditional engineering principles. Instrumental in a PP project—removal of sulfur from petroleum products by bio-treatment of crude oil. Funded by the US Army and industry.

key word index: *biology; biotechnology; petrochemicals*

Business

Administration
Management

Richard Allison — 713 283-3251

University of Houston
2700 Bay Blvd., Houston, TX 77058

Business and Public Administration
Fax 713 283-3951

Has a technically-oriented curriculum with a focus on operation and maintenance. Technical exchange with the petrochemical industry and NASA. Roughly a third of the course material deals with PP concepts, the remainder with management and crisis handling. Presently they offer 6 UG and 8 Gr. courses related to PP. State and regional business/industry funding.

key word index: *business; management; petrochemicals*

Matthew Arnold/Frederick Long — 202 833-6556

1220 16th St., NW
Washington, D.C. 20036

Management Institute for Environment and Business (MEB)
Fax 202 833-6228

MEB is an independent non-profit organization that provides academic support in corporate stewardship of the environment. MEB has worked with over 100 universities and corporations, undertaking several environmental management education initiatives such as (i) publication of course development modules and a resource guide of abstracted materials, (ii) curriculum development assistance for faculty members building new courses and (iii) production of new case study materials on environmental issues in business. MEB is funded in part by EPA, AT&T and Rockefeller Brothers Fund.

key word index: *business; management; modules; case studies; book*

Jonathan Karpoff 206 685-4954

University of Washington (DJ-10)
Seattle, WA 98195

Business Administration

Focus is creating incentives for application of functional areas (accounting, financing, and marketing) to PP decisions. Example: corporate environmental clean-up costs are often assigned as overhead to the whole company; whereas PP costs will be assigned to a division, which is less likely to respond appropriately. Courses emphasize knowledge of PP and the need for incentives which are vital to drive a change in business thinking. Regional funding.

key word index: *business; management; accounting; marketing; incentives*

Alfred Marcus/Gordon Rands 612 624-2812

University of Minnesota
230 Mgmt/Econ.
Minneapolis, MN 55455

Strategic Management Organization
Fax 612 625-2873

Are incorporating PP thinking in management courses which is a move away from the pollution control thinking that influences business decision making. This is a difficult road to pursue since most management students lack the physical sciences background to understand and evaluate PP solutions. Case studies with a cost/benefit analysis of the PP is a start. The problem of student environmental literacy may be addressed by suggesting/requiring a physical or hard science background at the B.S. level for admission to a business/management program. Have published a book (fall 1991) on environmental issues that will be used in management curricula.

key word index: *business, management; accounting; economics; book*

Centers for Pollution Prevention

Jonathan Bulkley/Greg Keoleian 313 764-1412

U of Michigan, Dana Building
430 E. University, Ann Arbor, MI 48109

National PP Center for Higher Education
Fax 313 936-2195

The EPA National PP Center (NPPC) was established in Oct. 1991 to develop and disseminate PP educational materials for colleges and universities in a variety of disciplines. The NPPC is a collaborative effort between academia, industry, government, and public interest groups. It is actively collecting educational resources from faculty nationwide, as well as developing new material. The PP modules will be composed of some of the following types of materials: introductory/background materials, readings, journal articles, close-ended problems, open-ended problems, case studies, videos, computer software, and other resources. The NPPC is currently working with faculty in the University of Michigan's Industrial Design Department, College of Engineering (chemical engineering, industrial and operations engineering, and mechanical engineering), and the School of Business Administration (business law, corporate strategy, managerial accounting, and operations management) to develop effective educational modules which integrate PP and core concepts of the discipline. The NPPC also administers an internship program. Funding from EPA and industry.

key word index: *center; business; management; accounting; legislation; policy; chemical engineering; mechanical engineering; modules; case studies; internship*

Anthony Cortese 617 627-3452

Tufts University
Medford, MA 02155

Center for Environmental Management
Fax 617 381-3084

The educational mission of the environmental program is to foster an understanding of and responsibility for the environment through all disciplines. The school offers several options in degree programs for the UG, Gr., and professional. The program encourages responsible PP teaching and research. The University also provides a forum for the open flow of information among industry, government, international organizations, and academia to discuss and study environmental issues and their effects on society.

key word index: *center; professional education*

John Dresty 203 486-4015

University of Connecticut
Storrs, CT 06269

PP Research and Development Center
Environmental Research Institute
Fax 203 486-2269

The PP Research and Development Center (PPRDC) at the Environmental Research Institute (ERI) plans to develop educational programs to reeducate defense industry engineers and scientists. The goal is to foster an environmental industry that will result in entrepreneurial enterprises that will develop PP technologies, and manufacture hardware to support the technologies. The educational portion of the PPRDC program includes a fast track MS degree program in Environmental Engineering for professionals and short courses on PP at various regional campuses. The ERI routinely sponsors conferences in PP for business and industry.

key word index: *center; professional education*

Harry Edwards 303 491-5317

Colorado State University
Fort Collins, CO 80523

Director, Waste Minimization Assessment Center

Primary focus is on performing waste minimization assessments for small- and medium-sized businesses. Also provides training and seminars. Is currently developing a PP course to be taught in the engineering department. EPA funded for some projects.

key word index: *center; mechanical engineering; professional education; waste audits*

John Ehrenfeld 617 253-1694

Massachusetts Inst. of Technology
Cambridge, MA 02139

Center for Technology, Policy and Industrial Development
Fax 617 253-7140

The Center offers an UG program linking business and the environment. The curriculum emphasis is on chemicals in the environment; case studies and guest speakers are used in most courses. The program plans to (i) elucidate a new preventive environmental paradigm, centered on business practises, (ii) strengthen the role of science in public decision making, and

(iii) foster the learning of the PP paradigm in students and professionals. The center also plans to interface with the public and private sectors.

key word index: *center; business; case studies*

Roy Hartman 409 845-4930

Texas A&M University
Box 3367, College Station, TX 77843

Center for Waste Management
Fax 409 847-9396

Offers interdisciplinary UG courses in waste management, life cycle design, and waste reduction technology. Works with area businesses in evaluating their production programs. Believes in early training in science to understand the environmental issues. Interested in the development of environmentally friendly or substituted goods and goods manufactured from recycled materials; the challenge is developing a market for these goods through incentives. Self-generated funds.

key word index: *center; design; life cycle analysis; recycling; incentives; consulting*

Thomas Hauser 513 556-3693

U of Cincinnati
Cincinnati, OH 45221-0071

American Institute for Pollution Prevention
Dept. of Civil Engineering

Executive Director of the American Institute of Pollution Prevention (AIPP). AIPP serves as a link between EPA and industry by generating public and private sector support to aid EPA in its efforts to achieve industrial adoption of PP procedures. The institute consists of volunteer experts in the field. The mission of its Education Council is to "foster the widespread acceptance of pollution prevention processes and products and to promote the pollution prevention ethic in the private and public sectors." Some of the educational objectives are to: promote PP conferences, develop educational materials for members and universities, and disseminate these materials.

key word index: *center; civil engineering; education*

Archie McDonnell 814 863-0291

The Pennsylvania State University
Land and Water Research Bldg.
University Park, PA 16802

Environmental Resource and Research Institute
Fax 814 865-3378

The research and educational emphasis at the Institute is waste minimization, the bioremediation of hazardous waste, and process residue reclamation. The Institute is part of a consortium of four universities -- NJIT, Ohio State, MIT, and Penn State. The research venture of the consortium is targeted at developing substitute solvents for the pharmaceutical industry. Industry funded.

key word index: *center; solvent substitution; biotechnology; hazardous waste; recycling*

Steve Ostheim 412 286-5320

U of Pittsburgh
Pittsburgh, PA 15213

Center for Hazardous Materials Research

This center is a not-for-profit subsidiary of the U of Pittsburgh that provides staff assistance to teach discrete sections of PP courses. The Center conducts a variety of seminars and workshops, an provides a range of PP technical assistance to businesses. The Center is equipped to conduct on-site chemical or material evaluation and consultation on PP technology. Funded by PP Incentives for the States.

key word index: *center; consulting; waste audits*

Richard Schuler/Ellen Harrison 607 255-8576

Cornell University
Ithaca, NY 14853

Waste Management Institute
Center for the Environment
Fax 607 255-0238

The center promotes waste reduction education and research within the university by encouraging joint research proposals with non-center members. The center is active in public information dissemination and education and routinely works with area businesses to reduce waste. Have developed short courses on solid waste reduction presently expanding efforts to include PP concepts into existing coursework. On-going projects include developing a source reduction tool kit for municipal waste for the EPA. Funded by the NY State Environment and Research Development Authority.

key word index: *center; solid waste; consulting*

Dave Thomas 217 333-8940

Hazardous Waste Research &
Information Center (HWRIC)
One East Hazelwood Dr.
Champaign, IL 61820

Illinois Department of Energy
and Natural Resources
Fax 217 333-8944

HWRIC combines research, technical assistance, and informational services to help the state better understand and solve its hazardous waste problems. Education plays an important role in the center's mission which includes PP curriculum development in areas with limited exposure to the PP concept such as business and public health schools. The center also provides training and experience in PP techniques at its state-of-the-art analytical and research laboratories.

key word index: *center; professional education; business; public health; hazardous waste*

John Townsend / Ron Bhada 505 646-6419

New Mexico State University
Las Cruces, NM 88003

Waste Management Education &
Research Consortium (WERC)
Fax 505 646-4149

WERC is a consortium of three universities in New Mexico -- NM State University, U of NM and NM Institute of Technology -- with assistance from Los Alamos and Sandia Laboratories. WERC has over 200 UG students in its UG environmental minor curriculum. It offers a two-year associate degree program for students and professionals. The goal of WERC is to interface

with businesses and industry and share waste reduction and PP information and assist in developing practical solutions to complex waste problems, through an affiliation program. Also provides a database for waste management, field professionals and engineers, and training for managers. Funded by DOE ($5 MM/year) and the petrochemical industry.

key word index: *center; professional education; consulting; petrochemicals*

Allen White

617 266-5400

Tellus Institute
11 Arlington St., Boston MA 02116-3411

Director, Risk Analysis Group
Fax 617 266-8303

Oversees program in PP economics supported by EPA, state governments, and various private corporations. Studies how a firm's capital budgeting process and project financial investment practices may be altered to encourage PP versus end-of-pipe investments. Works with American Society of Testing and Materials in developing a national standard for total cost assessment (TCA), an alternative approach to conventional financial analysis which better accounts for long-term, hidden, and less tangible benefits of pollution prevention. Also involved in developing corporate-wide indicators of environmental performance. Methods, tools, and case studies developed will be available for educational purposes.

key word index: *center; business; accounting; economics; case studies*

Chemical Engineering

David Allen

310 206-0300

UCLA, 5531 Boelter Hall,
405 Hilgard Ave., Los Angeles, CA 90024

Dept. of Chemical Engineering
Fax 310 206-4107

Is working to include PP concepts into a freshman level environmental literacy course. Is also working to complete a problem manual for engineers (sponsored by the EPA) that deals with real PP situations. Teaches UG and Gr. engineering courses with an emphasis on PP, including a course jointly by engineering, public health and urban planning on Toxics Reduction. Is actively involved in promoting PP within the university and with area businesses.

key word index: *chemical engineering; public health; case studies; book*

Peter Counce

615 974-5318

U of Tennessee
419 Doughtery Bldg.
Knoxville, TN 37996

Dept. of Chemical Engineering
Fax 615 974-2669

Teaches UG course in industrial PP that is open to Gr. students from all disciplines. The main questions addressed in the course are "What is PP? How does it fit in? And how do we integrate it into our thinking?" Uses case studies where appropriate. Conducts PP design and process analysis for area businesses and industries. Good exchange with and support from ORNL and DOE.

key word index: *chemical engineering; process design; consulting*

Diane Dorland 218 726-7126

U of Minnesota, 231 Engg. Bldg.,
10 University Dr., Duluth, MN 55812

Dept. of Chemical Engineering
Fax 218 726-6360

Has a new program that addresses legislative aspects of PP in Jr. and Sr. level courses in engineering. Emphasizes flexibility, especially in the design component of engineering; urges students to reassess how we currently handle processes. Is developing interdisciplinary projects dealing with "green technology." State funded.

key word index: *chemical engineering; process design; legislation*

Larry Erikson 913 532-5584

Kansas State University
Manhattan, KS 66506-2501

Director, Hazardous Substance
Research Center
Fax 913 532-7372

Has introduced PP concepts to chemical and civil engineering students in seminars. The student response has been very positive. The Hazardous Substance Research Center while promoting PP does not support research in PP. Funded by EPA Regions 7-8 and DOE.

key word index: *chemical engineering; civil engineering*

Cheng-Shen Fang 318 231-5350

U of Southwestern Louisiana,
Box 42251, Lafayette, LA 70504

Dept. of Chemical Engineering
Fax 318 231-6688

The focus of teaching and research is in the areas of petrochemical waste treatment/minimization and PP. The bulk of the work is in end-of-pipe treatment, primarily because the region is heavily regulated by the EPA and industry funding is concentrated in meeting its short term needs. Some state funds are available for the study of the local photochemical smog (despite low automobile densities) and atmospheric emission surveys. Also interested in CO_2 recovery from coal-fired power plants.

key word index: *chemical engineering; petrochemicals; air quality; utilities*

Marvin Fleischman 502 588-6357

U of Louisville
Ernst Hall 106, Louisville, KY 40292

Waste Minimization Assessment Center
Fax 502 588-6355

The Center offers three courses related to risk reduction and two courses in industrial waste management. Some of the courses are on the curriculum in response to requests from local industry and consulting groups. For all the courses the Center invites outside speakers, organizes field trips, encourages networking in class, and uses a hands-on approach where appropriate. The curriculum is designed for the hard science student but is open to all. Would like to see (i) universities make a firm commitment to developing and including PP curricula in the system, (ii) that funding is available on a broad basis rather than to se[illegible]chools, and (iii) that PP also be an integral part of the manufacturing sector.

key word index: *chemical engineering; process design; risk; field trips*

Rakesh Govind 513 556-2761

U of Cincinnati
697 Rhodes Hall (ML 171)
Cincinnati, OH 45221

Dept. of Chemical Engineering
Fax 513 556-3473

Teaches concepts of waste minimization and PP through process synthesis/optimization. His research interest is in efficiency through detailed computer analysis of plants. Is interested in developing strong PP courses, which can only be developed through research. The funding for PP is, however, lacking.

key word index: *chemical engineering; process design; computer modelling*

William Hecker 801 378-2586

Brigham Young University (350 CB)
Provo, UT 84602

Dept. of Chemical Engineering
Fax 801 378-7799

Has developed a comprehensive UG air pollution control course in which some PP concepts are introduced. His research is in the area of catalytic convertors as an end-of-pipe treatment method for NOx reduction. Primarily industry funded.

key word index: *chemical engineering; air quality*

Marquita Hill 207 581-2301

U of Maine, 117 Jenness Hall
Orono, ME 04469

Chemicals in the Environment Research Center
Fax 207 581-2323

Has developed a practical and interactive course, "PP Through Understanding and Managing the Chemicals in Our Lives," which is offered in a short course format to educators and students in PP. The course focuses on "efficiency of use" and includes completion of a PP project. Plans to work on a teaching notebook of PP experience and feels there is a need for a systematically organized database for various aspects of PP (i.e. chemical production, use, substitution, properties, etc.) that is easily accessible. Also interested in the necessary behavior modification strategies that will be needed. EPA funded.

key word index: *chemical engineering; education; behavior; book*

Ralph Kummler 313 577-3800

Wayne State University
Detroit, MI 48202

Chemical and Metallurgical Engineering
Fax 313 577-3810

Has taught ~150 engineers over the past two years in PP strategies in the course, "Waste Minimization." Under contract with EPA to provide interns to small businesses in Michigan for waste reduction management. Works directly with industry to provide technical assistance. Operates with part-time faculty and uses case studies from the automobile industry. Funding by auto industry.

key word index: *chemical engineering; consulting; automobile; internship; case studies*

James Noble 617 628-5000 x2089

Tufts University
4 Colby St., Medford, MA 02155

Dept. of Chemical Engineering
Fax 617 627-3991

Has developed a course "Hazardous Waste Treatment Technologies" for chemical and civil engineers. The course introduces PP concepts but focuses on pollution control and waste treatment.

key word index: *chemical engineering; civil engineering; hazardous waste*

Michael Overcash/Jim Ferrell 919 515-2325

North Carolina State University
Raleigh, NC 27695-7905

Pollution Prevention Research Center
Fax 919 515-3465

Based in the Chemical Engineering Department, this center is currently active in research related to PP in petroleum refining and silicon chip manufacturing. Has in the past offered a course on industrial waste reduction. The Center itself is not involved with educational aspects of PP, but individual researchers deal with PP in many of their classes. The Center plans to promote PP but was in a reorganizational mode at the time of the survey. Industry sponsored.

key word index: *chemical engineering; center*

Vito Punzi 215 645-4946

Villanova University
Villanova, PA 19085

Dept. of Chemical Engineering
Fax 215 645-4941

Teaches a special topics course in hazardous waste handling and minimization open to chemical engineering Jr.'s and Sr.'s. Feels that engineering students must have a good background in chemistry and unit operations to understand and spot opportunities for waste reduction. Engineering decisions are driven by the bottom-line economic amelioration, and PP may be best worked into a course from that viewpoint. Research includes recovery of values from industrial waste waters and environmental application of reverse osmosis.

key word index: *chemical engineering; hazardous waste; economics; recycling; water*

Joseph Reynolds/Louis Theodore 212 920-0185

Manhattan College
Bronx, NY 10471

Dept. of Chemical Engineering
Fax 212 796-9812

Offer a graduate elective three unit engineering course on PP. Directed an NSF workshop in 1992-93 for college faculty that was concerned with the development of a problem workbook on PP. Co-author (L. Theodore) of the 1992 Van Nostrand Reinhold book, *Pollution Prevention.* Currently preparing a tutorial of PP. Run seminars on pollution prevention for EPA.

key word index: *chemical engineering; professional education; book*

Christian Roy 418 656-7406

Université Laval
Ste-Foy, P. Québec, Canada G1K 7P4

Dept. of Chemical Engineering
Fax 418 656-5993

Teaches an introductory course on PP as well as a graduate course which emphasizes treatment technologies. Believes that problems related to incineration and landfilling (i.e. secondary pollution) are real and development of alternate technology is imperative. For the past 10 years the major thrust has been development of vacuum pyrolysis processes for waste management and recycling.

key word index: *chemical engineering; process design; recycling*

Henry Shaw 201 596-2938

New Jersey Institute of Technology
University Heights, Newark, NJ 07102

Dept. of Chemical Engineering
Fax 201 802-1946

Introduces PP in a senior level Capstone course, "Engineering Plant Design." Uses group projects as a teaching tool. Research areas include catalytic oxidation of chlorinated solvents and reducing VOCs by new solvent selection. Plans for the future are to incorporate research results and new case studies in the PP curricula. Funded by EPA, NSF, and the State of NJ.

key word index: *chemical engineering; solvent substitution; air quality*

Dilip Singh 216 742-1737

Youngstown State University
Youngstown, OH 44555

Dept. of Chemical Engineering
Fax 206 742-1998

Teaches industrial pollution control, wastewater treatment, and accident and emergency management with heightened awareness of PP. Research interests include application of artificial intelligence and neural network methodologies to process dynamics and control. Environmental policy decisions are based on a myriad of factors covering a wide range of disciplines. Is currently exploring the application of neural networks to model decision-making processes.

key word index: *chemical engineering; computer modeling; process control*

Dean Ulrichson 515 294-6944

Iowa State University
Sweeney Hall, Ames, IA 50011

Dept. of Chemical Engineering
Fax 515 294-2689

Teaches safety, health, and environmental topics process simulation and design. Plans to develop a senior elective course that introduces PP concepts in all of the above topics.

key word index: *chemical engineering; public health; process design*

Margrit von Braun 208 885-7838

U of Idaho, 6th and Urquhart
Moscow, ID 83843

Dept. of Chemical Engineering
Fax 208 885-7462

Has built PP concepts into chemical engineering courses entitled "Advanced Plant Design" and "Hazardous Chemical Waste." The courses are open to Sr. and Gr. students.

key word index: *chemical engineering; hazardous waste; plant design*

Gregory Yawson 313 577-3848

Wayne State University
Detroit, MI 48202

Chemical and Metallurgical Engineering
Fax 313 577-3810

Currently teaches PP as part of a graduate level course as well as a pre-college program. Major thrust is research in industrial and agricultural waste recycling, recovery, and reuse. Directs a EPA funded source reduction internship program for Michigan residents. Also involved in developing a two-year associate degree program related to PP. Member of UNEP/IED contact list of experts on cleaner production, International Association for Clean Technologies and Global Network for Low and Non-waste Technologies.

key word index: *chemical engineering; agriculture; professional education; solid waste; hazardous waste; recycling; internship*

Chemistry

Peter Ashbrook 217 333-1000

U of Illinois, Urbana-Champaign
Urbana, IL 61801

Environmental Health and Safety

On-going research activities relate to laboratory waste minimization methods. Efforts are primarily on the research end of waste minimization (with some attention to implementation of PP concepts) in the development of a hierarchy of solutions. Education of PP is not the requirement of this state grant.

key word index: *chemistry; laboratory*

Gary Hickernall/ Thomas Carrol 315 536-4411

Keuka College
Keuka College, NY 14478

Dept. of Natural Science
Fax 315 536-5216

Introduces PP concepts in general and organic chemistry courses and laboratories. Have reduced waste in all chemistry experiments (e.g. substituted (i) CrO_3 with bleach in the synthesis of adipic acid from cyclohexane and (ii) K_2CrO_4 with non-polluting organics in spectrophotometer demonstration of Beer's Law). Science advisor to the Westchester Environmental Coalition. Are in the planning stages for an environmental bachelor's degree at Keuka College.

key word index: *chemistry; laboratory; consulting*

Kent Mann 612 625-3563

U of M[illegible], 207 Pleasant St., SE
Minnea[illegible] N 55455-0431

Dept. of Chemistry
Fax 612 624-7541

Has upgraded several chemistry laboratory experiments with PP in mind. In general chemistry courses he relates the chemistry of the environment to real issues such as acid rain, ozone depletion, etc. Chemistry, as a discipline, is not a significant waste generator; however, waste reduction and PP work in the group has been spurred recently by high disposal costs. The department commitment to PP is strong and future plans include development of a comprehensive PP curricula. Uses micro-scale lab techniques. State funded.

key word index: *chemistry; laboratory*

Scot Wherland 509 335-3360

Washington State University
Pullman, WA 99164

Dept. of Chemistry

Is working on introducing PP ideas in a general chemistry course and laboratory experiments. Has gradually substituted toxic and heavy metals in the "unknowns" with non-toxic elements. Is actively looking down the PP road for the development of a strong chemistry education curricula.

key word index: *chemistry; laboratory*

Civil/ Environmental Engineering

Curtis Bryant 602 621-2266

U of Arizona
Tucson, AZ 85721

Dept. of Civil Engineering
Fax 602 621-2550

Is interested in developing interdisciplinary educational modules focusing on human attitudes and technical capabilities needed to foster PP. Believes that human behavioral implications and consumer perspective on product use and waste are key factors in planning for avoidance and substitution in PP. Worked with the anthropologist Dr. Rathje on the psychology of garbage production and opportunities for reuse. Is seeking funding from federal agencies.

key word index: *civil engineering; solid waste; behavior; modules*

Ryan Dupont 801 750-3227

Utah State University
UMC-8200, Logan, UT 84322-8200

Asst. Director, Utah Water Research Laboratory
Civil and Environmental Engineering
Fax 602 621-2550

A senior elective course in PP will be introduced in the UG program, winter 1993. Course covers PP concepts in both industrial and private sectors, and provides a quantitative approach for decision making in terms of emissions reduction and economics through PP fundamentals and case studies. Research focus on treatment methods using low energy, in-situ bio-treatment on soils.

key word index: *civil engineering; biotechnology; economics; soil*

Kumar Ganesan 406 496-4239

Montana Tech
Butte, MT 59701

Dept. of Environmental Engineering
Fax 406 496-4133

Has recently introduced PP as an integral part of a course in air pollution control systems. Plans to organize research projects aimed at development of new technology for air pollution reduction and prevention. Offers several professional education courses related to air quality engineering, spotting PP opportunities, and taking the necessary action to minimize pollution.

key word index: *civil engineering; air quality; professional education*

Robert Pojasek 617 721-4000

Tufts University
GEI, 1021 Main St.
Winchester, MA 01890

Department of Civil and Environ. Engineering
Corporate VP of Environ. Programs

This popular Gr. course is in its third year and will probably be offered both semesters in the '93-'94 school year. It examines how a manufacturer can go about manufacturing a product more efficiently based on a thorough process analysis and materials balance. Two "hands-on" team projects are central to the course; one deals with identifying and ranking source reduction opportunities in a real process, and the second with an evaluation of a company's PP program. Dr. Pojasek also serves as the President of the American Institute for PP.

key word index: *civil engineering; process design; business; management; field trips*

Angelos Protopapas 718 260-3632

Polytechnic University
6 Metrotech Center
Brooklyn, NY 11201

Dept. of Civil and Environmental Engineering
Fax 718 260-3136

Introduces PP concepts in two groundwater hydrology courses. The courses emphasize contaminant transport, treatment technologies, and PP. Plans to offer an extension course on PP open to the broader Metrotech community (an academic-industrial complex).

key word index: *civil engineering; water*

Lisa Riedle 608 342-1539

University of Wisconsin
1 University Plaza, Plattville, WI 53818

Dept. of Civil Engineering
Fax 608 342-1566

Plans to introduce source reduction and PP from a broad perspective into the current environmental thinking within the Department of Civil Engineering. Currently teaches substitution and avoidance as sound environmental practice with respect to the use of many consumer products.

key word index: *civil engineering; behavior*

Ken Williamson/Sandra Wood 503 737-6837

Oregon State University
Apperson Hall, Corvalis, OR 97331

Dept. of Civil Engineering
Fax 503 737-3052

Together have worked on developing Waste Reduction seminars, that have served as an introduction to PP at the Gr. level. The issue of integrating PP and other environmental problems into engineering curricula is currently being studied.

key word index: *civil engineering*

Community College

Stephen Colwell 203 575-8220

Waterbury State Tech. College
Waterbury, CT 06708

Environmental Management
Fax 203 575-8096

Teaches a course on environmental control processes for minimizing industrial air and water pollution. Students are kept abreast of new technology and environmental policy, and are introduced to PP and recycling opportunities as appropriate. The school offers certificate and associate degree programs.

key word index: *community college; policy; air quality; water; recycling*

Brian Zelten 206 789-2300

Seattle Community College
2606 NW 91 St, Seattle, WA 98117

Hazardous Materials Training

Has organized a waste management seminar using local business and government professionals as speakers. Uses a role-playing format to illustrate real world issues. Teaches students about business protocol and how it may be used effectively to implement PP.

key word index: *community college; business; role playing*

Education

Richard Bright 404 880-8515

Clark Atlanta University
Atlanta, GA 30314

Education and Training
Fax 404 880-8522

Director of a K-12 teacher training program which focuses on PP and environmental science concepts. The program emphasizes science education for the K-12 educators to better prepare students for college and PP issues. Field trips are part of the curriculum. CEPER and DOE funded.

key word index: *education; K-12; professional education; education; field trips*

Law

Maxine Lipeles — 314 935-5455

Washington University
1 Brookings Dr., St. Louis, MO 63130

Engineering and Policy
Fax 314 935-5449

Teaches Sr. and Gr. level courses in environmental law. Covers the five primary environmental laws and their application and interpretation with respect to waste minimization and PP. Students are asked to write a paper on selected environmental issues from a legal standpoint. The benefits of PP will be targeted.

key word index: *legislation; policy*

Richard Ottinger — 914 422-4324

Pace University Law School
White Plains, NY 10603

Center for Environmental Legal Studies
Fax 914 422-4180

Directs the Energy Project which seeks to have electric and gas utilities invest in energy conservation and renewable resource derived power. Teaches a utility reform course educating lawyers in advocacy of the above. Published a study valuing societal costs of pollution from power plants and advocates the use of these values in utility resource selection and pollution taxes.

key word index: *legislation; energy; economics; incentives; utilities*

Other

Nuclear Engineering Design

Edward Klevans — 814 863-1653

The Pennsylvania State University
Sackett Bldg.
University Park, PA 16802

Nuclear Engineering
Fax 814 865-8499

Teaches a Sr. and Gr. level course on radioactive waste management. Areas of interest include liquid metal reactor design, thermal hydraulic safety, plant life extension, and fuel management. Plans to include waste minimization concepts into the neutronics and design area.

key word index: *nuclear engineering; plant design; utilities*

Dundee Navin chandra — 412 268-7019

Carnegie-Mellon University
Pittsburgh, PA 15213

The Robotics Institute
Fax 412 621-5477

Teaches UG product design and process development to prevent pollution in the life cycle of automobiles. Courses include design decisions for (i) materials for non-structural parts (i.e. steel vs. aluminum, aluminum vs. plastic, etc.), and (ii) modularizing plastic and aluminum components to facilitate disassembly for reuse. All courses are interdisciplinary and require completion of a group project. On-going projects include, design for reuse/recyclability of appliances such as telephones and refrigerators. Funded by auto industry.

key word index: *computer science; product design; process design; life cycle analysis; recycling; automobile*

Susan Smith 704 227-7492

Western Carolina University
Cullowhee, NC 28723

Center for Improving Mountain Living
Fax 704 227-7422

Activities of the Center include PP assistance to local business/industry, organization of recycling programs, market development, and proper land use. The Center counsels the service industry such as tourism on using legislation to leverage environmental improvements. Also instructs high school teachers, purchasing agents, photography businesses, and others on playing a role in PP to keep the environment clean. Funded by a variety of state sources and private foundations.

key word index: *education; economics; land use; consulting; recycling; education*

Becky Yust 612 624-9700

U of Minnesota, 240 McNeal Hall
St. Paul, MN 55108

Design, Housing and Apparel
Fax 612 624-2750

Teaches, "The Designed Environment," (100 students/year) which introduces PP from a product-use perspective. PP opportunities are introduced in applied design arts, graphics design, set production, etc. Students are asked to evaluate the factors that go into the design task and look for material substitution, avoidance, and reuse opportunities. Field trips to landfills, polluted areas, and recycling centers are part of the course. Teaches life cycle analysis to facilitate the student's understanding on how things got to this stage in the landfills and polluted areas. Funded by USDA, Agricultural Extension Services, and overseas projects.

key word index: *design; life cycle analysis; behavior; field trips*

Professional Education

Clari Binder 805 681-5200

University of California--Santa Barbara
5540 Ekwill St., Suite B
Santa Barbara, CA 93101

Environmental Health Services
Fax 805 681-5370

Trains employees to become registered environmental health specialists. These specialists are qualified to be environmental enforcement inspectors. Uses site visits and videos to demonstrate the complexity of waste inspection and PP.

key word index: *professional education; waste audit; video*

Deborah Coury 801 532-1717

EnviroSearch, 844 South 200 East
Salt Lake City, UT 84111-4203

Director of Pollution Prevention
Fax 801 532-1777

Teaches PP as part of an occupational health course at the School of Medicine, University of Utah. Emphasis is on waste prevention and handling in the medical field. Course content evolves annually as society and regulations change. The course is offered once a year (15-20 students). Uses guest speakers.

key word index: *professional education; medical; legislation*

Pat Eagan 608 263-7429

U of Wisconsin
Madison, WI 53706

Engineering Professional Development
Fax 608 263-3160

Teaches waste minimization courses nationally to professionals. Life cycle analysis, which is a tracking method used to evaluate the environmental impact of any item, is emphasized. Has evaluated the effect of commercial packaging on the environment from a life cycle and market demand perspective (i.e. how do market forces influence packaging of an item?). Self-generated funding.

key word index: *professional education; life cycle analysis; marketing*

Cheri Eir 510 644-6510

2180 Milvia St., Suite 308
Berkeley, CA 94704

Toxics Program, UC--Berkeley
Fax 510 644-6015

Started out with a hazardous waste internship program to study and audit waste streams. He is now working on an ordinance requiring acceptable PP plans from generators and enforce this requirement through routine inspection/enforcement programs. Will train hazardous material specialists to carry out the program.

key word index: *professional education; legislation; waste audits; hazardous waste; internship*

Cynthia Fridgen 517 355-9578

Michigan State University
Natural Resources Bldg.
E. Lansing, MI 48824

Resources Development
Fax 517 353-8994

Runs an educational outreach program on handling hazardous materials. Has developed a toll free telephone service for Michigan to address questions on the purchase, use, and disposal of products and materials. Assists area small businesses in their solid waste handling. Introduces PP in "behavior" terms only. EPA funded.

key word index: *professional education; hazardous waste; solid waste; behavior; telephone*

David Liebl/Wayne Pferdehirt 608 262-0385

University of Wisconsin-Extension
610 Langdon St., Madison, WI 53703

Solid and Hazardous Waste Education Center
Fax 608 262-6250

The center develops and conducts educational programs to communicate the need for PP and its cost/benefit analysis. Targeted audience — business managers, facility managers, government officials, engineering consultants, and extension agents. The courses use a hands-on format. The Center draws experts from industries, trade organizations, equipment suppliers, relevant government agencies, etc. to assist in their educational efforts.

key word index: *professional education; workshop*

Paul Stills 904 392-9570

University of Florida
3900 63rd Blvd., Gainsville, FL 32608

Continuing Education
Fax 904 392-6910

Teaches short courses (1-2 days) on waste management and regulation with an introduction to PP. Recently has switched to a 2-3 hour video and lecture program format on the site of small businesses. Was less successful with programs that exceed half a day and programs that are primarily PP (since there is no legal mandate to engage in PP). Attendance is down at present, reflecting the economic condition of small businesses in the area. Under contract with Florida Dept. of Environmental Regulations.

key word index: *professional education; legislation; video*

Donna Toy-Chen 213 237-1209

200 N. Spring St., Rm. 353
Los Angeles, CA 90012

Los Angeles Public Works, HTM Project
Fax 213 237-1445

Teaches a PP course (with field trips) at UC Riverside. Students are taught to recognize and implement waste minimization and PP technologies. The HTM staff also provides evaluation of industrial processes, waste stream analysis, and regulatory assistance to businesses and manufacturers upon request.

key word index: *professional education; legislation; waste audits; field trips*

Diane Wolcott 510 643-7143

UC--Berkeley, 2223 Futon St.
Berkeley, CA 94720

Environmental Hazard Management

Offers two courses in Public Health and Civil Engineering at UC Berkeley. The courses address the technical aspects of pollution control and the regulation of air toxic contaminants and are taught by local professionals. The topics are covered quantitatively. Case studies are used to illustrate the need for pollution control and PP.

key word index: *professional education; legislation; case studies*

Public Health

Kris Benson 907 276-2864

Alaska Health Project
Anchorage, AK 99517

Waste Reduction Assistance Program
Fax 907 279-3089

Teaches waste reduction and PP concepts, regulations, health and safety, and waste disposal in this Sr. level Environmental Health course. The course is open to all disciplines. The course materials are available nationally. Uses audio-visuals. Has developed several manuals to assist and educate local businesses and industry on waste management and planning for the future. Funded by various in-state agencies.

key word index: *public health; modules*

Dan Boatright 405 271-2070

U of Oklahoma
Box 26901, Oklahoma City, OK 73109

Public Health & Environmental Management
Fax 405 271-3039

Teaches and promotes waste management in short educational programs for health students and professionals. Would like to expand educational efforts (from risk analysis and waste management) to include some PP concepts. Works with a variety of health related industries on waste minimization and PP. The department is growing at the rate of 17% a year. Federal funding.

key word index: *public health; medical; professional education; consulting*

Steve Galitzer 913 551-7003

Kansas State University
Ward Hall, Manhattan, KS 66506-2501

Department of Public Safety
Fax 913 552-6952

Actively promotes PP and waste minimization programs through the classroom, satellite TV productions of industrial PP programs (i.e. mining waste), newsletters, etc. Strong proponent of the incentive-based PP programs for industry to reduce the number of waste streams, improve worker health & safety, and get off the EPA fee system. Is also studying the possibility of augmenting revenue sources for the EPA (regulatory fees, etc.) and expanding PP programs. Would like to see a bibliography of all the work at the five EPA centers to, among other things, improve communication between the centers.

key word index: *public health; incentives; video*

Social Sciences

Political Science
Geography

Terry Ball 612 634-0083

U of Minnesota
Minneapolis, MN 55455

Social Sciences
Fax 612 626-7599

Teaches a course dealing with PP ethics. This project-oriented course encourages "paying attention" to and critically examining the consequences of our actions on the environment. Students are required to submit a written report or a project video tape for the course.

key word index: *social science; political science; ethics; behavior*

Kathleen Bawn 310 825-3676

UCLA, Bunche Hall
Los Angeles, CA 90024

Political Science
Fax 310 825-0778

Will teach (beginning 1992-93) a course on the development of national environmental policies, emphasizing the ways political institutions influence the choice and administration of environmental regulation. PP and incentives for implementation of PP methods will figure prominently in the normative evaluation of environmental policy and of alternative policies.

key word index: *social science; political science; policy; legislation; incentives*

Diana Liverman 814 863-7004

The Pennsylvania State University
University Park, PA 16802

Earth and Mineral Sciences
Fax 814 863-7943

Has developed two UG interdisciplinary geography courses. Courses cover human use of and attitude towards the environment, soil erosion and deforestation, impact on human behavior, and the driving forces behind pollution escalation. Also addresses the impact of pollution on the sulfur, carbon, and nitrogen cycles; policy issues; and international conflicts over the issues. Draws on case studies and videos from across the world. Encourages in-class debates. Research focus on environmental problems of Mexico (i.e. global warming, consequences of climate changes on agriculture, etc.). Funded by NASA-EOS.

key word index: *social science; geography; atmospheric science; air quality; policy; behavior*

Marilyn Raphael 310 206-4590

UCLA, Bunche Hall
405 Hilgard, Los Angeles, CA 90024

Geography Department

Teaches a freshman course, "Relationship With the Environment," that addresses questions such as why pollution exists and how climatic conditions can escalate the effect of pollutants locally. Also teaches "Environmental Impact Analysis," a hands-on experimental course in which students complete a PP related group project. Both of the courses are offered twice a year and class enrolment usually exceeds 50 students. Her research interests include global climate and how it may be affected by low level greenhouse gases. May seek government funding for future projects.

key word index: *social sciences; geography; atmospheric science; air quality*

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Update/Correction Form

Name:

Title:

Address:

Telephone number:

Fax number:

Computer e-mail address (Internet, BITNET, etc.):

University Affiliation (if any):

Description of Pollution Prevention Education Activities:

Key words (see Appendix A or use your own):

(Over)

Please complete and mail to:
National Pollution Prevention Center — PP Directory
University of Michigan, 430 East University, Dana Building, Ann Arbor, MI 48109-1115

Individuals and organizations active in PP that were missed in the Directory:

Suggestions/Recommendations/Corrections for future versions of the Directory:

What would you like to see in the future in terms of research , education, industry involvement, funding, etc. with respect to pollution prevention?

Please complete and mail to:
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